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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/846,255	05/02/2001	Satoshi Kikuchi	207224US0	6560

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EXAMINER	
SCHILLINGER, LAURA M	

ART UNIT	PAPER NUMBER
2813	16

DATE MAILED: 06/25/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/846,255	KIKUCHI ET AL	
	Examiner	Art Unit	
	Laura M Schillinger	2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 April 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3 and 5-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3 and 5-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

This office action is in response to the Amendment B, Paper No. 10 dated 3/4/03 and The Interview with Applicant.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-3 and 5-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mehta ('102) as applied to claim 1 above, and further in view of Verhaverbeke et al ('624).

In reference to claim 1, Mehta teaches a method comprising:

Bringing a mixed gas of anhydrous HF gas and a heated inert gas into contact with a substrate surface such that at least a portion of a low-density film is removed without impairing a high density film beyond a tolerance (Abs., Lines: 1-28) wherein the mixed gas does not contain steam (Col.6, lines: 10-15).

However, Mehta fails to teach applicant's amended claim limitation by continuously exposing the anhydrous gas in contact with the substrate. Applicant argues that the scope of his "continuously exposing" claim language, does not encompass continuously exposing through pulsing gas as taught by Mehta.

Verhaverbeke et al ('624) teaches that HF vapor etching is performed in dynamic mode, which is a mode where the process gases are continuously forming (Col.3, lines: 20-21).

It would have been obvious to one of ordinary skill in the art to modify Mehta's teachings to include a dynamic mode (continuous flow) of vapor etching as taught by Verhaverbeke because Verhaverbeke teaches that the pulsing (static mode) or continuous flow (dynamic mode) may be used to selectively etch silicon oxides and further that the well known continuous flow of gases reduce processing times through evacuation/etch cycling (See Verhaverbeke Col.3, lines: 20-27- teaching that the method may be used to etch (hence remove) silicon oxide films and line: 20- which teaches static or dynamic processes may be implemented to etch silicon oxide).

In reference to claim 2, Mehta teaches wherein the high density film is necessary for the substrate and the low density film is not (Col.1, lines: 28-32).

In reference to claim 3, Mehta teaches wherein the low density film has impurities which are removed with the film (Abs., lines:20-28).

In reference to claim 5, Mehta teaches wherein the substrate is Si, the high density film is a thermal oxide film and the low density film is a natural oxide film formed on the substrate or an oxide film formed with a chemical solution (Abs., lines: 20-28 and Col.1, lines: 5-32).

In reference to claim 6, Mehta teaches wherein the substrate is for a semiconductor device (Abs., lines: 18-25).

In reference to claim 7, Mehta teaches wherein the high density film is formed on the substrate via a substrate layer (Col.5, lines: 20-40).

In reference to claim 8, Mehta teaches wherein the mixed gas is maintained at a temperature between room temperature and 200 degrees C (Col.4, lines: 5-15).

In reference to claim 9, Mehta teaches wherein the mixed gas is maintained at a temperature between room temperature and 100 degrees C (Col.4, lines: 5-15).

In reference to claim 10, Mehta teaches wherein the surface of the substrate is between 30 and 50 degrees C (Col.4,lines: 10-15).

In reference to claim 11, Mehta teaches wherein the mixed gas has a flow rate between 40 to 60 L/min (col.4, lines:15-25).

In reference to claim 12, Mehta teaches wherein the concentration of anhydrous HF gas is in the range of 1 vol. % to 3 vol. % (Col.4, lines: 25-30).

In reference to claim 13, Mehta teaches wherein the concentration of anhydrous HF gas is in the range of 1.5 vol. % to 2 vol. % (Col.4, lines: 25-30).

In reference to claim 14, Mehta teaches wherein the high density film is a thermal oxide film and is removed in an amount of 0 to not greater than 0.2 nm (Col.5, lines: 1-10).

Response to Arguments

Applicant's arguments filed 4/7/03 have been fully considered but they are not persuasive. Applicant argues that one of ordinary skill in the art would not combine the teachings of Mehta and Verhaverbeke. Applicant supports his arguments by listing differences between the prior art references themselves.

Applicant first argues that Verhaverbeke is not concerned with the *selective* removal of one out of two silicon oxide layers and is not concerned with anhydrous hydrogen fluoride. However such arguments are not persuasive because Col.3, lines: 10-15; Col.4, lines: 10-15; Col.5, lines: 55-65) of Verhaverbeke teaches the implementation of anhydrous HF. Further, Verhaverbeke teaches selectively etching silicon oxide (Col.5, lines: 25-45).

Applicant further argues that Verhaverbeke teaches away from dynamic mode, however this is very unpersuasive. The disclosure provided by Verhaverbeke teaches that *either* static or dynamic mode may be implemented in the etch process (Col.3, lines:20-30). This is further substantiated by Verhaverbeke's claims 11 and 12 where Verhaverbeke claims conducting his method in static mode (claim 11) and in dynamic mode (claim 12). Therefore, Applicant's assertion is unpersuasive and this further substantiates the Examiner's position that

Verhaverbeke teaches that EITHER static or dynamic mode may be implemented to carry out a silicon oxide etch.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Laura M Schillinger whose telephone number is (703) 308-6425. The examiner can normally be reached on M-T, R-F 7:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl W Whitehead, Jr. can be reached on (703) 308-4940. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

LMS
June 11, 2003

Carl Whitehead

CARL WHITEHEAD, JR.
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